REMARKS

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Examiner in the Office action states that the attenuating element being driven by a drive device in response to signals from the first and second detector must be shown or the features canceled from the claims.

In response to this objection, applicants assert that attenuating element 3 being driven by a driving device 4 in response to signals from the first and second detectors 51, 52 are both shown on Fig. 1 of the present invention. Thus, it is respectfully requested that the objection to the drawings can be overcome without drawing amendment.

Specification

The title of the present invention is objected to because it is not descriptive.

In response to this objection, applicants hereby amend the title to "Variable Optical Attenuator Having A Splitter To Monitor Light Signals."

Claim Objections

Claim 12 is objected to because of the informalities whereby "main" is misspelled and "said input GRIN lens" and "said output GRIN lens" lack proper antecedent basis.

In response to these objections, applicants have amended claim 12 such that the objections are now overcome.

Claim Rejections Under 35 U.S.C. 112

Claims 1-11 are rejected under 35 U.S.C. 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

In response to this rejection, applicants have amended claim 1 and cancelled claims 2, 3, 5 and 7-11. Amended claim 1 is now believed to overcome the rejection. Since claims 4 and 6 depend on amended claim 1, they should also now overcome the rejection.

Claim Rejections Under 35 U.S.C. 102

Claims 1 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Inagaki et al. (US 6,603,596). Examiner in the Office action states that Inagaki discloses, inter alia, an optical attenuator comprising an optical splitter (516) for splitting input optical signals from an input fiber into two portions, one portion of the input optical signals being transmitted to an attenuating element (530), and a second portion being transmitted to a first detector (519), an output port (531) for splitting attenuated optical signals into two portions, one portion being transmitted to an output fiber and a second portion being transmitted to a second detector.

In response to this rejection, applicants have incorporated the subject matters of claims 2, 3 and 5 into claim 1, and cancelled claims 2, 3 and 5 without prejudice.

Regarding amended claim 1, applicants assert that Inagaki only discloses a beam splitter 516 that can be used to split input light signals into two portions, and that Inagaki fails to disclose detailed structure of the beam splitter as indicated below. That is, the following limitations are not disclosed by Inagaki: ***(I)*** the

optical splitter comprising a ferrule and a GRIN lens; ***(II)*** the ferrule retaining an end of the input fiber and an end of a second fiber; and ***(III)*** the GRIN lens having a first surface coated with an antireflection film and a second surface coated with a beam splitter film. Thus, applicants assert that the structure of the present invention is very different from that of Inagaki, and that claim 1 is novel over this reference. Since claim 6 depends on claim 1, claim 6 is also novel over this reference.

Claim Rejections Under 35 U.S.C. 103

Claims 2-5 and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inagaki et al. in view of Shen et al. (US 6,130,984) and Qin et al. (US 6,603,906). Examiner in the Office action states that Inagaki does not specifically disclose using a ferrule and a GRIN lens as the optical splitter; that Shen teaches (see Figure 2) an optical attenuator having a ferrule (34) and a GRIN lens (36) equivalent to a collimator; that Shen does not teach the splitting; and that Qin further teaches (see Figure 3) a ferrule (21) and a GRIN lens (22) with a beam splitter coating (23) for splitting optical signals. Examiner further states that Shen recognize that ferrules and GRIN lenses improve coupling between fibers and an optical attenuator, and that Qin recognizes that a compact beam splitter can be achieved with a coating on a GRIN lens.

In response to this rejection, applicants have incorporated the subject matters of claims 2, 3 and 5 into claim 1, and have cancelled claims 2, 3, 5 and 7-11 without prejudice.

Regarding amended claim 1, as asserted above, this claim is novel over Inagaki. Applicants further assert that amended claim 1 is unobvious Inagaki in view of Shen and Qin. As stated by Examiner, Inagaki fails to disclose a splitter

having a ferrule and a GRIN lens, and Shen fails to disclose a ferrule and a GRIN lens cooperating to split light. Applicants assert that Shen cannot be combined with Inagaki. In Shen, as shown in Figures 2 and 4, light from the input fiber 16 is reflected by the reflector 26, and is transmitted back to the output fiber 18. Although Inagaki recognizes the importance of splitting the input light for sampling, Inagaki fails to disclose the detailed structure. Since Shen cannot provide a splitting function, one of ordinary skill in the art has **no motivation** to combine Shen with Inagaki. Furthermore, even if Shen were to be combined with Inagaki, the combination would be **unworkable**. That is, if Shen's ferrule and GRIN lens were put in the position of the splitter 516 in Inagaki, all the light signals from the input fiber would be reflected to the first detector 519, and thus input light signals would not be attenuated. One of ordinary skill in the art would not foresee a reasonable likelihood of success in combining Shen and Inagaki.

Applicants further assert that Shen cannot be combined with Qin. In Shen, the reflector 26 is separate from the GRIN lens 36, and an attenuator is disposed therebetween. ***All input light signals are reflected*** by the reflector 26. In Qin, as shown in Figure 3, the beam splitter coating 23 is coated directly on the GRIN lens 22, a first portion 26 of the input light signals ***passes through*** the beam splitter coating 23 and enters the detector 19, a second portion 25 is reflected back to the output fiber 16. **The functions and locations** of Shen's reflector and Qin's beam splitter coating are **distinctly different**. Even if Shen were to be combined with Qin, one of ordinary skill in the art would need to remove the attenuator between the GRIN lens and the reflector; attach the reflector of Shen to the GRIN lens; and substitute the reflector with the beam splitter coating. **There are too many steps/ re-modifications needed in combining** Shen with Qin to provide a splitter in accordance with the present invention. Furthermore, Shen **teaches away** from the

beam splitter's location. Shen states that the reflector 26 should be separate from the GRIN lens 36, with an attenuator disposed therebetween, thus giving the attenuator of Shen an enhanced attenuation (see column 5, lines 16-21). Therefore, one of ordinary skill in the art could not provide a beam splitter coating on the GRIN lens in view of Shen and Qin.

Applicants finally assert that Inagaki cannot be combined with Shen and Qin to provide an attenuator in accord with the present invention. Inagaki fails to disclose a detailed structure of a splitter. In Qin, a portion of the light signals passing through the GRIN lens 22 is transmitted to the detector 19, and another portion of the light signals split by the beam splitter coating 23 is transmitted back to the ferrule 21. In contrast, the present invention's detector receives a portion of the light signals transmitted back to the ferrule, and another portion of the light signals split by the splitter is transmitted to the attenuator. In Qin, light signals are output from the splitter via a fiber, and the light signals need to be further collimated for attenuation. In contrast, light signals output from the splitter of the present invention are already collimated. Qin and the present invention not only differ from each other regarding the location of the detector, but also regarding the position of light signals output from the splitter. Such differences enable the present invention to provide an attenuator having a more simple structure. In Qin, one of ordinary skill in the art could not exchange the position of the detector and the position of light signals output from the splitter, since Qin **teaches away** from the detector's position as provided in the present invention. Qin states such configuration helps the splitter to have a reduced assembly time and long-term reliability (see column 5, lines 14-21). Thus, one of ordinary skill in the art could not change the position of the detector, and there would be no motivation to do so. Furthermore, the cited references fail to disclose a GRIN lens having a first surface

coated with an antireflection film and a second surface coated with a beam splitter film at the same time.

Therefore, the above-described differences and considerations in a combination render amended claim 1 unobvious over the cited references. Since claims 4 and 6 both depend on independent amended claim 1, they should also be patentable.

Regarding claim 12, as asserted above, directly combining Shen and Inagaki would be unworkable. Shen could not be combined with Qin, and Shen **teaches away** from the beam splitter's location as provided by the present invention. Furthermore, Qin **teaches away** from the detector's position as provided by the present invention, and Qin could not be combined with Inagaki to provide the attenuator of claim 12. The above-described differences and considerations in a combination render claim 12 unobvious over the cited references.

In view of the above remarks, the subject application is believed to be in a condition for allowance, and an action to such effect is earnestly solicited.

Respectfully submitted,

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